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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,766	03/15/2001	Juan Ferrera	FIS920000237US1	4985

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EXAMINER
GURZO, PAUL M

ART UNIT	PAPER NUMBER
2881	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/809,766	Applicant(s) FERRERA ET AL.
	Examiner Paul Gurzo	Art Unit 2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 15 March 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 140, 160, and 170. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

On page 4, line 2, there should be a period instead of a comma.

On page 5, line 20, there is an opening parenthesis but no closing one.

On page 7, line 30, the sentence does not convey a complete thought.

On page 12, line 23, there is no period.

On page 17, line 1, 'scintillator' is spelled incorrectly.

On page 18, line 26, there should be a comma after 'plane'.

On page 24, claim 3, line 9, 'shaping' is spelled incorrectly.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508), and further in view of Saitou et al. (5,311,026).

Regarding claim 1, Katsap et al. teach a charged particle beam tool that uses a mesh grid (23) disposed in the path of the electron emission (18) (col. 3, lines 62-67, Fig. 2). It is well known in the art that this mesh grid produces a shadow pattern. Further, each beamlet is focused moving through its respective mesh cell, and the mesh grid has the transparency that is taught in the specification. Though Katsap et al. does not mention dithering, it is known that this repetitive moving at high speed is known as dithering. They do not teach detection on a sparse array of targets, but Saitou et al. teach an electron beam projected to an arbitrary point on a wafer (11). It is possible to draw a desired pattern on the wafer by controlling the beam deflection by means of a computer (col. 3, lines 1-11, Fig. 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include a detection capability with the mesh grid feature so that proper positioning for implantation can occur with high precision.

Regarding claim 2, Katsap et al. teach imposing a shadow pattern and dither pattern as applied above. Saitou et al. teach a shaping deflector (6) as well as a shaping aperture (3 and 7) for passing the charged particle (col. 2, line 62 - col. 3, line 11 and Fig.1).

Regarding claims 3 and 4, Saitou et al. teach a first shaping aperture (3), a deflector (6), and a second shaping aperture (7) that intercepts a portion of the charged particle and shapes the remainder of the particle beam (Fig. 1).

Regarding claim 6, Katsap et al. teach the repetitive moving as applied above. Further, it is well known in the art that repetitive movement at high speed is known as dithering, and the mesh grid produces a shadow pattern.

Regarding claim 8, Katsap et al. teach that electron beam exposure tools are based on the flying spot concept of a highly focused beam, raster scanned over the object plane (col. 1, lines 17-19).

Claims 5, 11, 13, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508) in view of Saitou et al. (5,311,026), and further in view of Goodberlet et al. ("Extending Spatial-Phase-Locked Electron-Based Lithography to two Dimensions", Applied Physics, December 1997, pages 7557-7559).

Regarding claim 5, Katsap et al. teach an illumination system and light reduction as applied above, but do not teach the use of fiducial marks of a scintillating material to detect this output of light. However, Goodberlet et al. teach the use of a fiducial grid as well as fabricating this grid from scintillating material. They also teach the claimed optical detection (page 7559, Section 4, paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to include fiducial marks of a scintillating material because a scintillator can yield near infinite values of contrast.

Regarding claim 11, Katsap et al. teach the repetitive moving as applied above. Further, it is well known in the art that repetitive movement at high speed is known as dithering, and the mesh grid produces a shadow pattern.

Regarding claim 13, Katsap et al. teach that electron beam exposure tools are based on the flying spot concept of a highly focused beam, raster scanned over the object plane (col. 1, lines 17-19).

Regarding claim 16, Saitou et al. teach a source of a beam of charged particles (1), a means for shaping the particle beam (6), and a means for deflecting the charged particle beam to a desired location on the target as applied above. Further, Katsap et al. teach a mesh grid for causing a shadow pattern and a means for dithering this pattern as applied above. It is well known in the art to use fiducial marks as Goodberlet et al. teach in their design. Further, it is known that fiducial marks are used on the target and it is inherent to the design of Saitou et al. that their detection will detect the claimed shadow pattern that is incident on the fiducial marks.

Regarding claim 17, Goodberlet et al. teach the use of scintillating material as applied above.

Regarding claim 18, it is an obvious matter of design choice to align the fiducial marks on the target so that they correspond to the shadow pattern because that will ensure that the beam is properly detected and it will be easier to generate a correction means when the most accurate beam placement is known.

Regarding claim 19, Katsap et al. depict the dithering step at top portion of the design, and, though they do not depict the claimed shaping means, it is known in the art to use a mess grid in close contact with a shaping means as taught above. Therefore, it is a matter of obvious design choice to move the mesh that produces the shadow pattern to the top and before the shaping means.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508) in view of Saitou et al. (5,311,026), and further in view of Collier et al. (4,393,312). The above-applied prior art does not teach the correlation of the repetition time to spot exposure time. However, Collier et al. teach that for a given writing spot exposure time, an electron beam exposure system can expose areas at a rate four times as fast as conventional raster scanning. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use spot exposure time because it is an art recognized equivalent to repetition time.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508) in view of Saitou et al. (5,311,026), and further in view of Sakamoto et al. (5,051,556).

The above-applied prior art does not teach an angled shape that is retraced with an offset. However, Sakamoto et al. teach that the beam is offset from the optical axis, and the path can be adjusted by decomposing the offset of the electron beam into an angular offset component ϕ representing a deviation of the beam direction from vertical and further into a lateral offset component δ representing a lateral deviation of the beam from the properly aligned beam path, and further by changing these offset components ϕ and ϕ independently (col. 11, lines 29-46).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508) in view of Saitou et al. (5,311,026) in view of Goodberlet et al. ("Extending Spatial-Phase-Locked Electron-Based Lithography to two Dimensions", Applied Physics, December 1997), and further in view of Collier et al. (4,393,312). The above-applied prior art does not teach the correlation of the repetition time to spot exposure time. However, Collier et al. teach that for a given writing spot exposure time, an electron beam exposure system can expose areas

at a rate four times as fast as conventional raster scanning. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use spot exposure time because it is an art recognized equivalent to repetition time.

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508) in view of Saitou et al. (5,311,026) in view of Goodberlet et al. ("Extending Spatial-Phase-Locked Electron-Based Lithography to two Dimensions", Applied Physics, December 1997), and further in view of Sakamoto et al. (5,051,556).

The above-applied prior art does not teach an angled shape that is retraced with an offset. However, Sakamoto et al. teach that the beam is offset from the optical axis, and the path can be adjusted by decomposing the offset of the electron beam into an angular offset component ϕ representing a deviation of the beam direction from vertical and further into a lateral offset component δ representing a lateral deviation of the beam from the properly aligned beam path, and further by changing these offset components ϕ and δ independently (col. 11, lines 29-46).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Katsap et al. (6,333,508), and further in view of Aizaki (5,932,884). Katsap et al. teach the use a mesh grid which forms a shadow pattern as applied above. They do not teach this pattern within a shaped or patterned charged particle beam. However, Aizaki teaches the use of a mesh grid (66a), which causes a shadow pattern within the shaped beam (col. 3, lines 43-64, Fig. 2). Further, Aizaki teaches deflecting the beam with a deflector (55) and shaping lens (54a and 54b) to a desired location on the target (60). In addition, he teaches an exposure-time controller for controlling the exposure time of a specimen to the charger beam. When the value of the detected electric current by the current detector exceeds a preset value, the correction data generator

generates the current-density correction data and the exposure-time correction data in such a way that the current density of the charged beam is decreased to the preset value or less and the exposure time of the specimen is increased to keep the amount of exposure substantially unchanged (col. 5, lines 8-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make use of the Aizaki design so that mesh grid and resulting shadow pattern are in intimate contact with the beam shaping and deflecting means so that a more accurate detection and subsequent correction can occur.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Gurzo whose telephone number is (703) 306-0532. The examiner can normally be reached on M-Thurs. 7:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Lee can be reached on (703) 308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

PMG

PMG
November 6, 2002

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